

LANDFILL GAS REMEDIATION PLAN

**NORTH MECK C&D LANDFILL FACILITY
PERMIT No. 60-13
PHASE 1/2**

**Prepared For:
GREENWAY WASTE SOLUTIONS OF NORTH MECK, LLC**

**Prepared By:
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
CHARLOTTE, NORTH CAROLINA**

CEC Project 111-370.001

July 17, 2014

North Carolina Board of Examiners
For
Engineers and Surveyors
License No. C-3035



Civil & Environmental Consultants, Inc.

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1.0 INTRODUCTION

North Meck C&D Landfill Facility (Facility) is operated by Greenway Waste Solutions at North Meck, LLC (GWS) and currently operates under Solid Waste Facility Permit Number 60-13. The Facility address is 15300 Holbrooks Road, Huntersville, North Carolina. The site is bound on the west by private property owners, on the east by a Mecklenburg County property, the north by Holbrooks Road, and on the south by the private property owners.

The closed disposal area Phase 1/2 is located in the southern portion of the site and is generally bounded by an unnamed tributary of Cane Creek to the north private property to the east and south, and west. Waste placement in this disposal unit generally occurred during the years 1993 to 2002. The disposal area is approximately 23.3 acres. It has been reported that the eastern and southern areas of the disposal unit is “ringed” with land-clearing debris approximately 30-40 feet wide and 20-30 feet deep.

Based on perimeter methane monitoring well readings, GWS is implementing this Landfill Gas Remediation Plan with the goal of preventing off-site landfill gas (LFG) migration. Civil & Environmental Consultants, Inc. (CEC), on behalf of GWS, proposes to implement a Remediation Plan including installation of an active LFG extraction and migration control system (System) comprised of 25 perimeter extraction wells and three in-waste extraction wells connected to a vacuum blower system. LFG will be extracted by vacuum from the waste mass and the perimeter of the landfill and collected and conveyed by piping to a central blower skid. See Appendix A – Construction Drawings and Appendix B – Operation and Maintenance Plan for more details on the proposed system.

2.0 SYSTEM PERFORMANCE

After installation and startup of the system, technicians will survey and adjust the performance of the system periodically. Methane monitoring well readings around the perimeter of the landfill will be taken monthly to monitor the efficacy of the system. The system will be adjusted based on these readings to improve system performance. After six months of continuous operation of

the system, the sampling data from the perimeter monitoring wells will be analyzed and the overall performance of the system will be evaluated.

3.0 DESIGN CONSIDERATIONS

CEC designed the proposed LFG migration control system based on existing information and perimeter methane monitoring well data. The system is designed to prevent off-site migration of LFG to adjacent properties by extracting LFG from the waste mass with vertical wells as well as cutting off the migration pathway with perimeter vertical extraction wells. All extraction wells are connected to a High Density Polyethylene (HDPE) header piping system that collects and conveys the gas to a LFG blower skid. All piping in the system is above-ground unless otherwise noted in the Construction Drawings. Condensate in the collection piping is designed to flow into one of three “J” style condensate traps by gravity.

The system is designed with valves in the header collection system as well as a wellhead valve at each of the 28 extraction wells in order to support balancing and tuning of the wellfield system.

One design consideration for this system was potential noise impacts from the blower skid on adjacent property owners. The system is designed to use the existing topography and buffers to minimize any noise impacts. Specifically, the blower skid is placed with part of the landfill between the blower skid and the nearest adjacent property owner. The blower skid site and the landfill perimeter both offer buffers with trees and vegetation. Additionally, the blower skid is designed with an exhaust silencer.

It is not expected that the LFG migration control system will affect any existing facility operations beyond the added routine operation and maintenance of the LFG migration control system. The system is located on the closed Phase 1/2 construction and demolition landfill.

4.0 PERMITTING

This Construction and Demolition (C&D) landfill currently operates under Solid Waste Facility Permit Number 60-13. No federal, state or local air permitting requirements have been identified

for C&D landfills. The Facility is not expected to emit pollutants listed in Mecklenburg County Air Pollution Control Ordinance (MCAPCO) 1.5211(d). No air permitting requirements have been identified for the Facility; therefore, an air quality permit is not required.

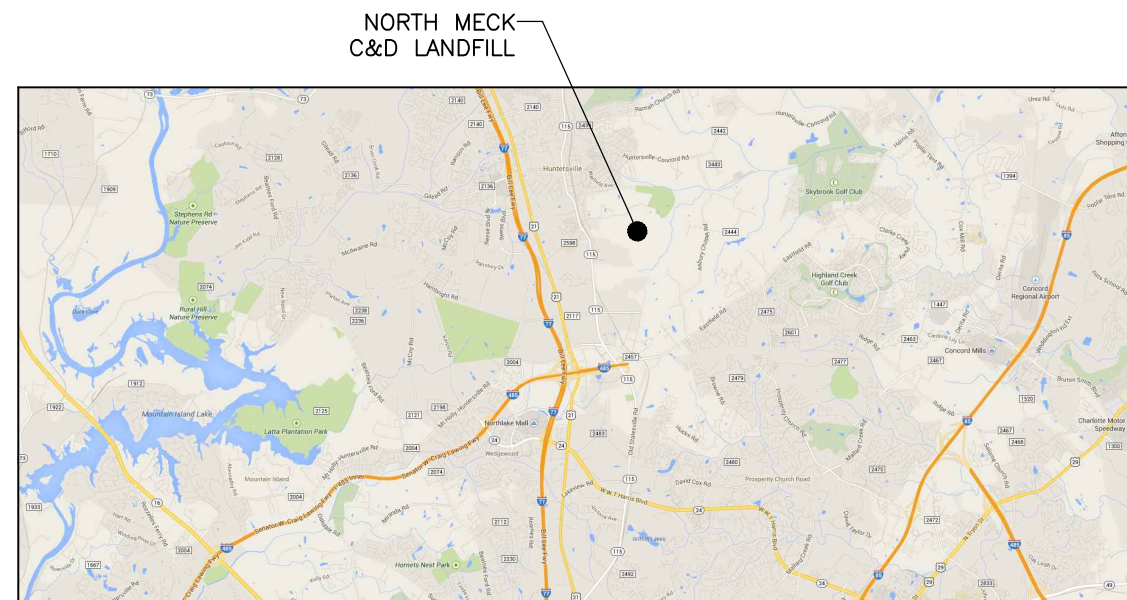
APPENDIX A

CONSTRUCTION DRAWINGS

REVISION RECORD		
NO	DATE	DESCRIPTION
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LIST OF DRAWINGS:

- | | |
|------|-----------------------------------------------|
| C001 | COVER SHEET |
| C101 | EXISTING CONDITIONS PLAN
AND GENERAL NOTES |
| C201 | PROPOSED SITE PLAN |
| C301 | WELL DETAILS |
| C302 | WELL AND PIPING DETAILS |

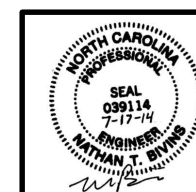


LOCATION MAP
SCALE: N.T.S.



JULY 2014

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**LFG REMEDIATION PROJECT
CONSTRUCTION DRAWINGS**

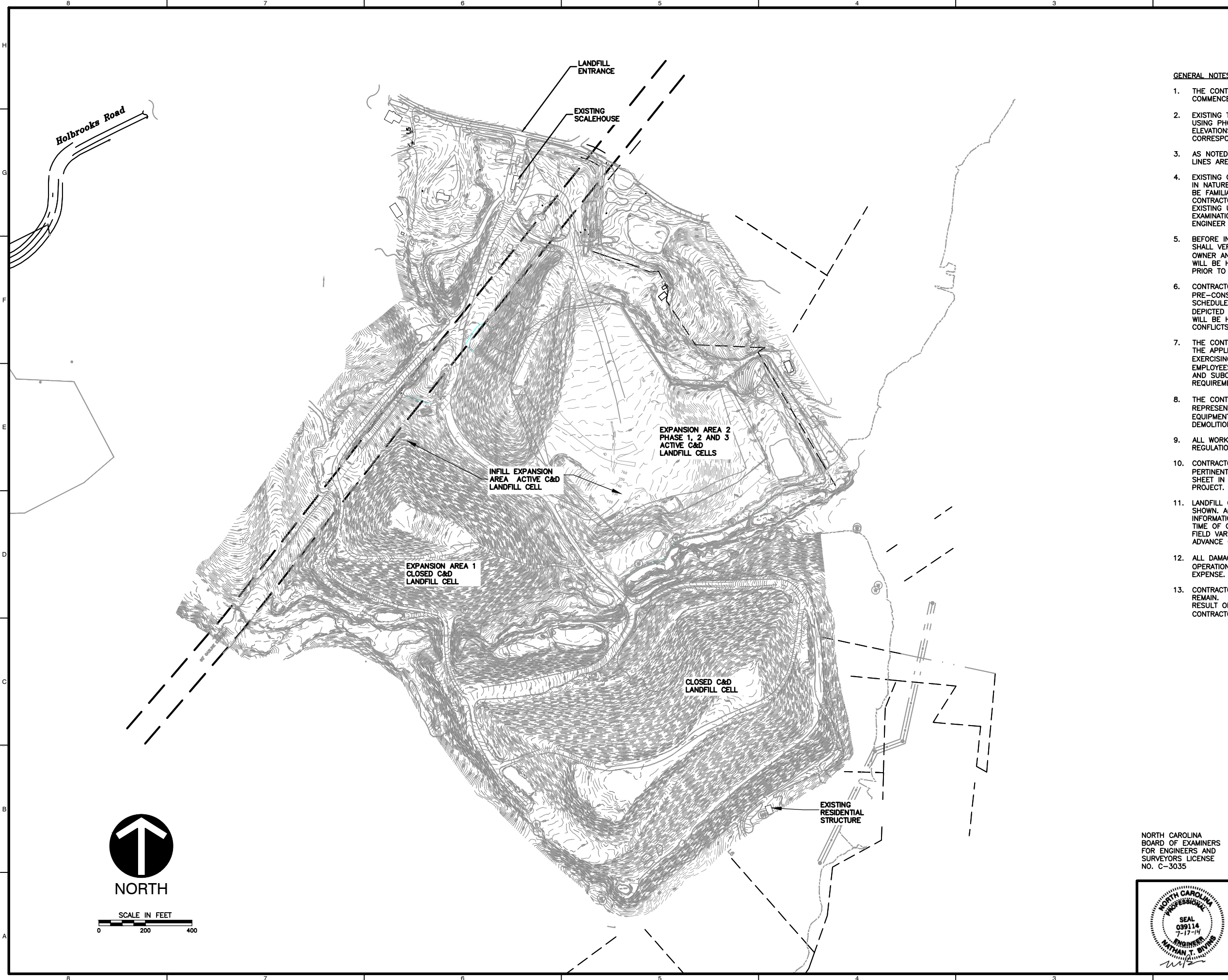
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DATE:	JULY 2014	DWG SCALE:	AS SHOWN	PROJECT NO:	111-370

COVER SHEET

C001

PAGE 1 OF 5

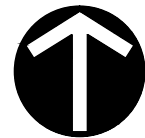
P:\2011\111-370-C&D\001\Drawings\111-370-C101-EXISTING CONDITIONS PLAN.dwg(C101) LST(2/2/2014 - 11:01 AM) - LP: 2/17/2014 11:01 AM



REVISION RECORD		
NO	DATE	DESCRIPTION

GENERAL NOTES:

- THE CONTRACTOR SHALL OBTAIN ALL PERMITS AND APPROVALS PRIOR TO COMMENCEMENT OF WORK.
- EXISTING TOPOGRAPHY WAS COMPILED BY INDEPENDENT MAPPING CONSULTANTS (IMC) USING PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED FEBRUARY 7, 2008. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL AND LOCATION COORDINATES CORRESPOND TO THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM.
- AS NOTED BY IMC, THE POSITIONS OF CONTOURS AND FEATURES WITHIN VEGETATION LINES ARE ESTIMATED.
- EXISTING CONDITIONS AS DEPICTED ON THESE PLANS ARE GENERAL AND ILLUSTRATIVE IN NATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EXAMINE THE SITE AND BE FAMILIAR WITH EXISTING CONDITIONS PRIOR TO BIDDING ON THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. IF CONDITIONS ENCOUNTERED DURING EXAMINATION ARE DIFFERENT THAN THOSE SHOWN, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY.
- BEFORE INSTALLATION OF ANY LANDFILL GAS SYSTEM COMPONENT, THE CONTRACTOR SHALL VERIFY ALL CROSSINGS, BY EXCAVATION WHERE NECESSARY, AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS. THE OWNER AND OWNER'S ENGINEER WILL BE HELD HARMLESS IN THE EVENT HE IS NOT NOTIFIED OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.
- CONTRACTOR, OWNER, AND ENGINEER SHALL VERIFY ALL FIELD CONDITIONS INCLUDING PRE-CONSTRUCTION WELL SURVEY STAKES AND OWNER/ENGINEER WILL MODIFY WELL SCHEDULE WITH ANY DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND CONDITIONS DEPICTED IN THESE PLANS PRIOR TO DRILLING. THE OWNER AND OWNER'S ENGINEER WILL BE HELD HARMLESS IN THE EVENT OF LACK OF NOTIFICATION OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR COMPLYING WITH THE APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS, TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUBCONTRACTORS TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.
- THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND OWNER'S REPRESENTATIVE FOR ANY AND ALL INJURIES AND/OR DAMAGES TO PERSONNEL, EQUIPMENT AND/OR EXISTING FACILITIES OCCURRING IN THE COURSE OF THE DEMOLITION AND CONSTRUCTION DESCRIBED IN THE PLANS AND SPECIFICATIONS.
- ALL WORK PERFORMED BY THE CONTRACTOR SHALL CONFORM TO THE LATEST REGULATIONS OF THE AMERICANS WITH DISABILITIES ACT.
- CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS DRAWING SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THIS SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THIS PROJECT.
- LANDFILL GAS SYSTEM LOCATIONS AND ELEVATIONS BASED ON EXISTING CONDITIONS SHOWN. ACTUAL FIELD CONDITIONS AT THE TIME OF CONSTRUCTION MAY VARY FROM INFORMATION SHOWN. REVISIONS TO LAYOUT MAY BE NECESSARY IN THE FIELD AT THE TIME OF CONSTRUCTION IN ORDER TO CONFORM WITH THE INTENT OF THE DESIGN. ALL FIELD VARIATIONS ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER IN ADVANCE OF PERFORMANCE OF THE WORK.
- ALL DAMAGE TO EXISTING ROADWAY WHICH RESULTS FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED WITH LIKE MATERIALS AT THE CONTRACTOR'S EXPENSE.
- CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES, STRUCTURES, AND FEATURES TO REMAIN. ANY ITEMS TO REMAIN THAT HAVE BEEN DISTURBED OR DAMAGED AS A RESULT OF CONSTRUCTION SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT CONTRACTOR'S EXPENSE.



NORTH

SCALE IN FEET
0 200 400

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LFG REMEDIATION PROJECT
CONSTRUCTION DRAWINGS

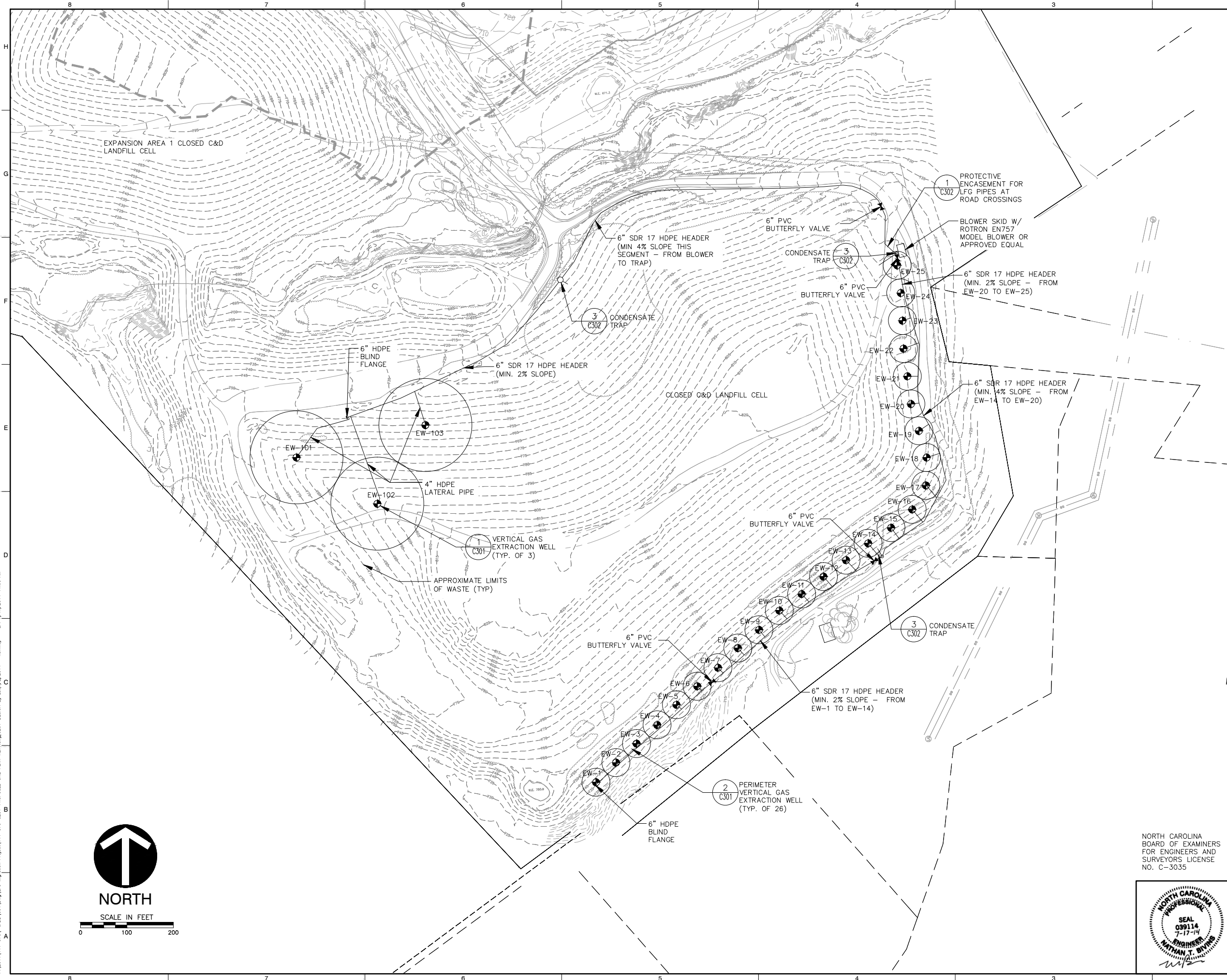
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DATE: **JULY 2014** DWG SCALE: **1"=200'** PROJECT NO: **111-370**

EXISTING CONDITIONS PLAN
AND GENERAL NOTES

DRAWING NO.:
C101
SHEET 2 OF 5

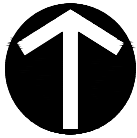
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REVISION RECORD		
NO	DATE	DESCRIPTION

GENERAL NOTES:


- ALL PIPING SHOWN IS ABOVE-GROUND SOLID HDPE PIPE UNLESS NOTED.
- BLOWER SKID TO BE CONNECTED TO EXISTING SINGLE PHASE ELECTRIC SERVICE AT BLOWER SITE.




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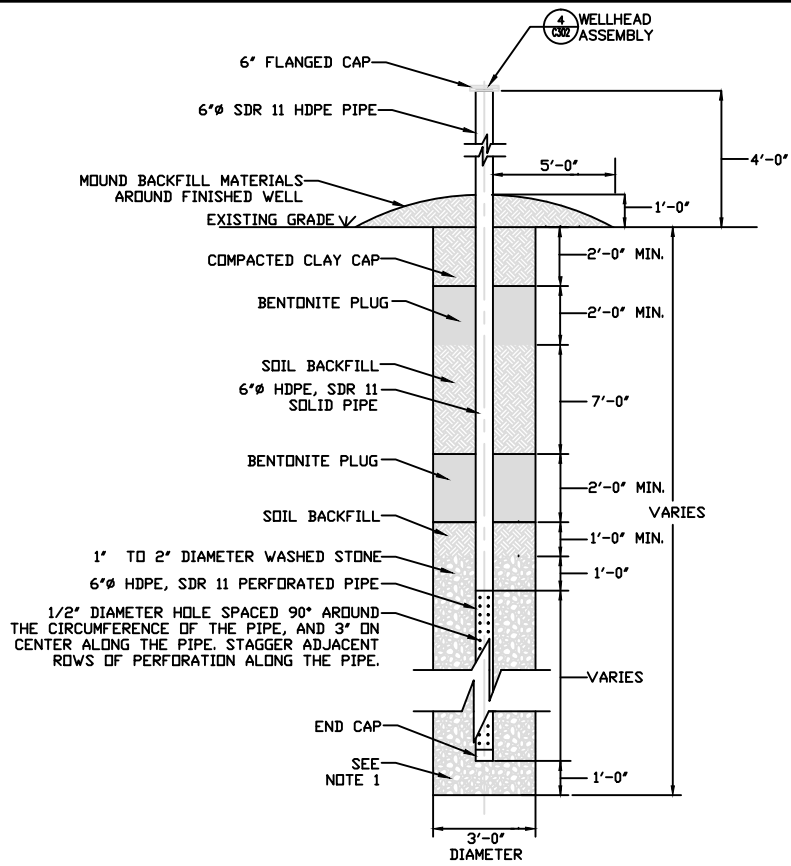
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**LFG REMEDIATION PROJECT
CONSTRUCTION DRAWINGS**

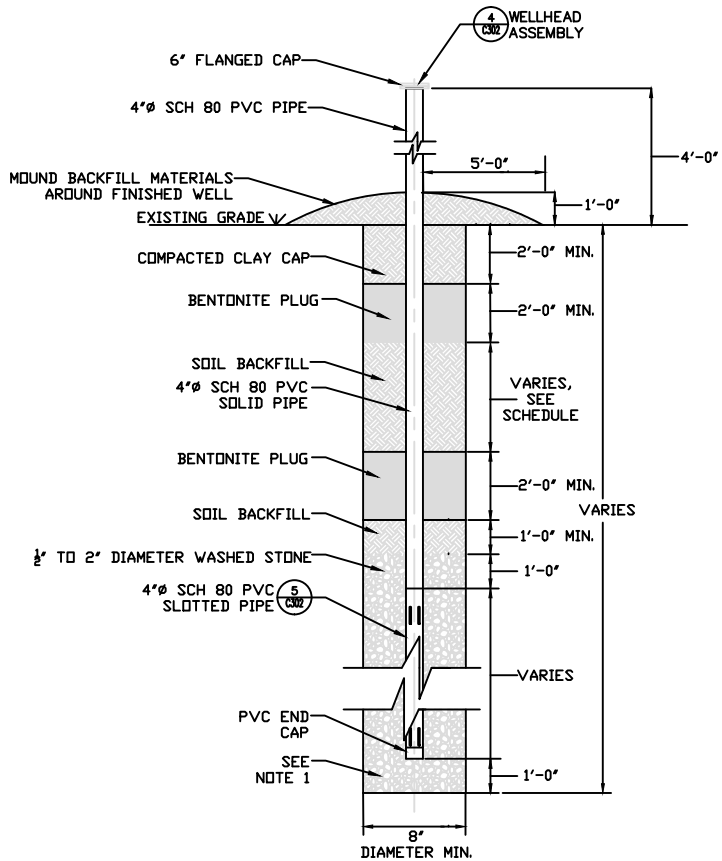
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PROPOSED SITE PLAN	C201 SHEET 3 OF 5
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VERTICAL GAS EXTRACTION
WELL DETAIL
1
C201
NOT TO SCALE



PERIMETER VERTICAL GAS
EXTRACTION
WELL DETAIL
2
C201
NOT TO SCALE

REVISION RECORD												
NO	DATE	DESCRIPTION										

North Meck LFG System Schedule												
Well ID	Existing EL	Estimated Groundwater EL	Estimated Bedrock EL	C&D Subgrade	Design Boring EL	Boring Depth	Perforated Length Total	Perforated Depth Start	Perforated Depth End	Above Ground Length	Solid Pipe Total	Gravel Length Total
EW-1	737	683	699		699	38	23	14	37	4	18	25
EW-2	737	683	700		700	37	22	14	36	4	18	24
EW-3	736	683	701		701	35	20	14	34	4	18	22
EW-4	736	683	703		703	33	18	14	32	4	18	20
EW-5	735	683	702		702	33	18	14	32	4	18	20
EW-6	735	683	701		701	34	19	14	33	4	18	21
EW-7	733	683	700		700	33	18	14	32	4	18	20
EW-8	730	683	699		699	31	16	14	30	4	18	18
EW-9	726	682	698		698	28	18	9	27	4	13	20
EW-10	728	682	698		698	30	20	9	29	4	13	22
EW-11	731	682	698		698	33	23	9	32	4	13	25
EW-12	729	681	693		693	36	26	9	35	4	13	28
EW-13	728	681	688		688	40	30	9	39	4	13	32
EW-14	727	679	702		702	25	15	9	24	4	13	17
EW-15	730	678	704		704	26	16	9	25	4	13	18
EW-16	732	676	707		707	25	15	9	24	4	13	17
EW-17	738	676	712		712	26	16	9	25	4	13	18
EW-18	745	676	717		717	28	18	9	27	4	13	20
EW-19	757	681	730		730	27	17	9	26	4	13	19
EW-20	757	684	732		732	25	15	9	24	4	13	17
EW-21	757	686	733		733	24	14	9	23	4	13	16
EW-22	760	687	734		734	26	16	9	25	4	13	18
EW-23	762	687	736		736	26	16	9	25	4	13	18
EW-24	767	692	739		739	28	18	9	27	4	13	20
EW-25	772	695	744		744	28	18	9	27	4	13	20
EW-101	772	703		708	708	64	48	15	63	4	19	50
EW-102	793	721		726	726	67	51	15	66	4	19	53
EW-103	750	691		696	696	54	38	15	53	4	19	40

NOTES:

- THIS WELL SCHEDULE IS PRELIMINARY AND SHALL BE FINALIZED FOLLOWING FIELD SURVEY OF WELL LOCATIONS PRIOR TO DRILLING. WELL SCHEDULE DRILLING DEPTHS AND MATERIAL QUANTITIES MAY CHANGE FOLLOWING SURVEY, BASED ON HYDROGEOLOGICAL DATA, OR BE FIELD ADJUSTED.
- EXISTING TOPOGRAPHY WAS COMPILED BY INDEPENDENT MAPPING CONSULTANTS (IMC) USING PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED FEBRUARY 7, 2008. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL AND LOCATION COORDINATES CORRESPOND TO THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM.
- WELL DEPTH IS DESIGNED TO BE THE HIGHER OF 5' ABOVE EXISTING GROUNDWATER OR AT BEDROCK ELEVATION.

MATERIALS LIST:

ITEM	QUANTITY
VERTICAL EXTRACTION WELLS	28
WELLHEAD ASSEMBLIES	28
CONDENSATE TRAPS	3
ROAD CROSSINGS	1
6" BUTTERFLY VALVE	3
6" SDR 17 HDPE LATERAL PIPE	3000 LF
4" SDR 17 HDPE LATERAL PIPE	800 LF

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LFG REMEDIATION PROJECT
CONSTRUCTION DRAWINGS

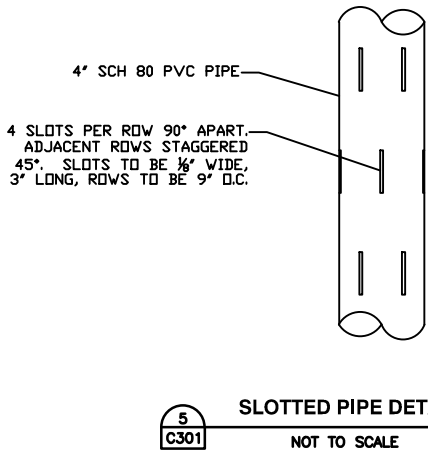
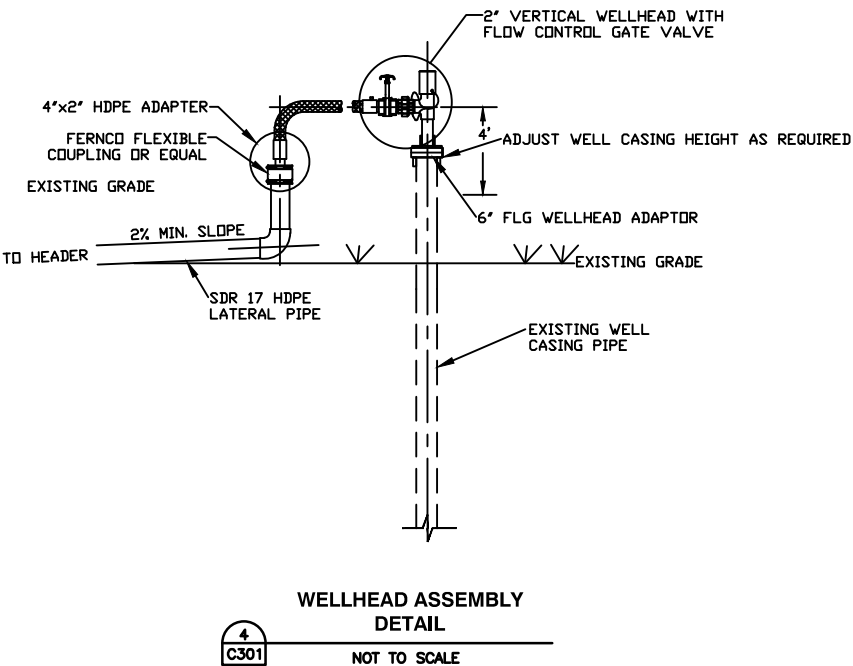
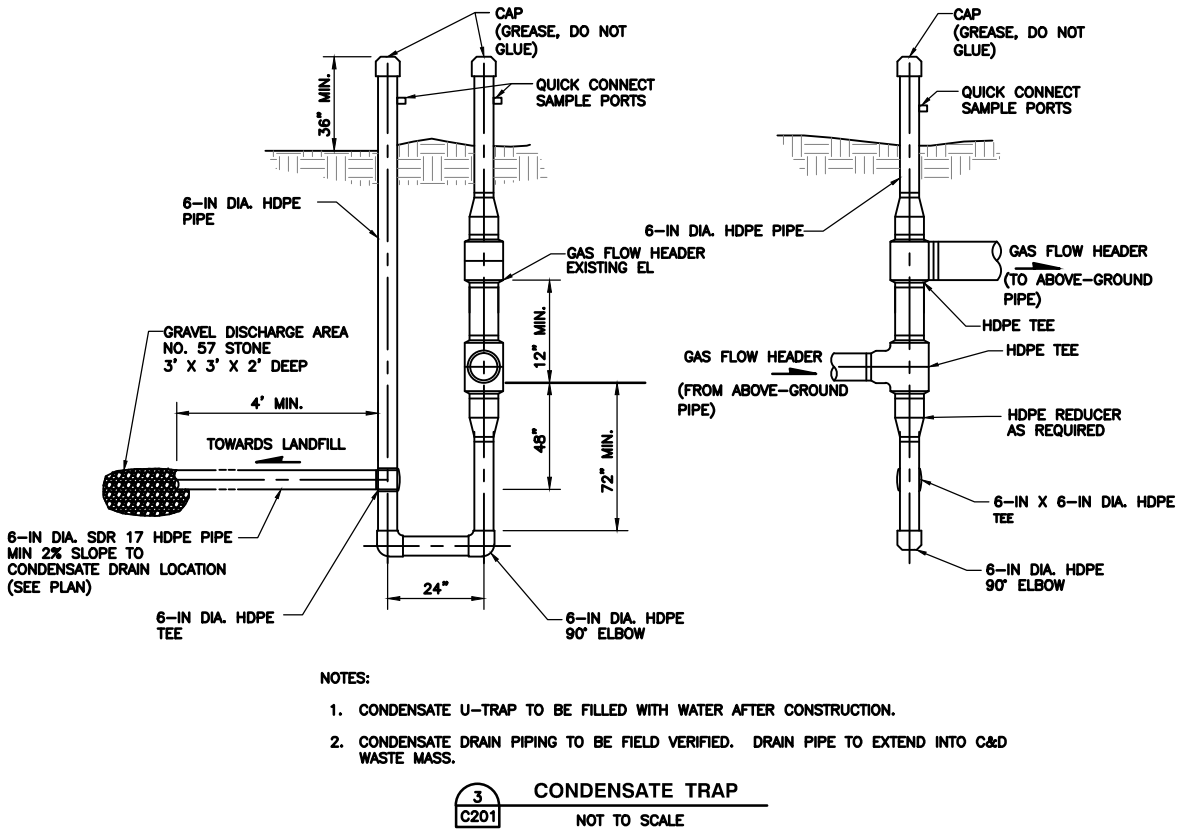
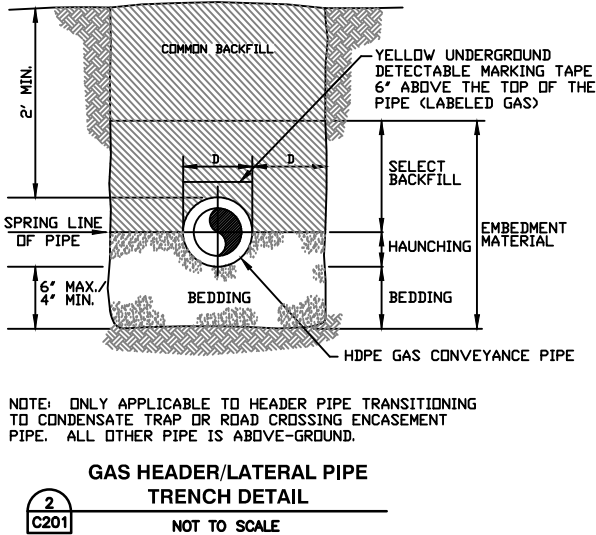
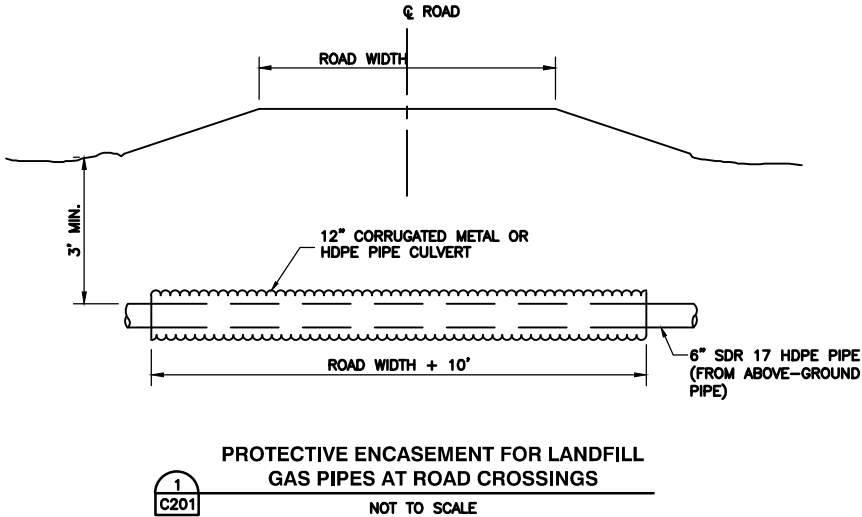
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DATE: **JULY 2014** DWG SCALE: **AS SHOWN** PROJECT NO: **111-370**

WELL DETAILS

DRAWING NO.:
C301

SHEET 4 OF 5

REVISION RECORD		
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CONSTRUCTION DRAWINGS

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DATE: **JULY 2014** DWG SCALE: **AS SHOWN** PROJECT NO: **111-370**

WELL AND PIPING DETAILS

C302
SHEET 5 OF 5

APPENDIX B

OPERATION AND MAINTENANCE PLAN

**OPERATIONS AND MAINTENANCE PLAN
LANDFILL GAS MIGRATION SYSTEM**

**NORTH MECK C&D LANDFILL FACILITY
PERMIT No. 60-13
PHASE 1/2**

**Prepared For:
GREENWAY WASTE SOLUTIONS OF NORTH MECK, LLC**

**Prepared By:
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
CHARLOTTE, NORTH CAROLINA**

CEC Project 111-370.001

July 17, 2014



Civil & Environmental Consultants, Inc.

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1.0 COMPONENT LIST

The North Meck C&D Landfill active LFG extraction and migration system is comprised of twenty five perimeter extraction wells and three in-waste extraction wells in Phase 1/2 connected to a vacuum blower system. LFG will be extracted by vacuum from the waste mass and the perimeter of the landfill and collected and conveyed by piping to a central blower skid. Below is a list of system components:

Equipment	Manufacturer	Model	Quantity
Blower	Rotron	EN757	1
Wellhead	Landtec	Accuflow	28
Valves	Asahi	6" Butterfly	3

2.0 SYSTEM OPERATION

The LFG migration control system is designed to be operated with minimal impact to existing Facility Operations and with little maintenance. The blower and vent stack equipment is provided with easy to use controls for manual startup and shutdown.

3.0 MAINTENANCE SCHEDULE

LFG System/Blower Maintenance Schedule								
Component	Frequency							
	Daily	Bi-Weekly	Weekly	Bi-Monthly	Monthly	Semi-Annually	Annually	As-Needed
Condensate Traps								
Check Liquid Level					X			
Header Piping System								
Piping Alignment Walk (Check Anchors, Damage, Low Spots, etc.)					X			
Check Valves for Proper Operation					X			
LFG Blower								
Drain Condensate from Blower Stack			X					
Inspect Blower Skid Foundation Pad							X	
Check Blower Motor Alignment							X	
Check Isolation Pads							X	
Check Bearing Temperature					X			
Check Vibration Levels					X			
Lubricate Motor Bearings								X
Check Drive Hubs and Couplings					X			
Clean Ventilation Openings of Blower								X
Check Wire Connections							X	
Flame Arrestor								
Clean Internal Blank per Manufacturer's Recommendations						X		X
Check Back Pressure and Clean Blank Assembly						X		X

*Please refer to the Manufacturer's Manual for replacement parts, procedures, etc.

4.0 CONTINGENCY PLAN

If there are problems with the LFG migration system, the Facility operator should contact the wellfield operator to attempt to troubleshoot the problem. In the event that the blower system shuts down or system troubleshooting is unsuccessful, the Facility operator will contact the appropriate parties below for service:

Wellfield Operator:

Nathan Bivins, CEC	980-237-0373 (office)
--------------------	-----------------------

Blower Operational Questions/Warranty Support:

Blower Manufacturer/Installer Contact Information

Engineering Support:

Nathan Bivins, CEC	980-237-0373 (office)
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Scott Brown, CEC	980-237-0373 (office)
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The Operational and Engineering Support personnel above should be notified of any system shutdown as soon as possible in order to minimize potential downtime of the LFG collection and control measures for the Facility.